PROCEEDINGS SERIES

# FOOD IRRADIATION PROCESSING

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population of mould and yeast as well as the total aerobic bacteria of the combined-treated grains (60°C, 4.0 kGy) remained nearly the same (i.e. 5.0 and 4.3 log cycles reduction, respectively). The control of the moist heat-treated grains, however, had mould and yeast and total aerobic bacteria counts lowered by 1.5 and 1.3 log cycles, respectively, after three months' storage at 80% r.h. The grains did not become rancid.

Triplicate samples showed that only control grains (20L and 20H) and the grains (20H) irradiated with 4.0 kGy contained 0.8–4.0 μg/kg of aflatoxin $B_1$ after three months' storage at 80% r.h. and 28°C.

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## DETERMINATION OF IRRADIATION D-VALUES FOR *Aeromonas hydrophila* IN GROWTH MEDIUM, BUFFER AND FISH

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To assess the potential of irradiation processing as a means of controlling the presence of *Aeromonas hydrophila* in marine products [1] three clinical isolates (K144, BA2 and BW83) and two food isolates (F6-10 and B2-10) were used in these studies. The cultures were irradiated in a caesium-137 source at doses up to 125 krad. Cultures were irradiated directly at 2 or 22°C in BHI growth medium, in potassium phosphate buffer (0.1M, pH 7.2), or in ground blue fish (Table I).[1] The number of survivors after exposure to various irradiation doses was determined by plating appropriate dilutions on duplicate plates of phenol red starch agar with 10 mg/L ampicillin, and enumerating amylase$^+$ colonies after 24 h incubation at 28°C. Survivor plots ($\log_{10}$ number of survivors versus dose) were determined by regression analysis of the data; correlation coefficients $\geqslant 0.96$ were obtained for all strains and variables. Decimal reduction doses (D values in krad)[2] were calculated as the reciprocal of the slope obtained from the regression analysis.

The D-values observed with the different strains were determined (Tables II–IV). Comparison of our data with those of Tarkowski et al. [2]

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[1] BHI = Brain, heart, infusion.

[2] 1 rad = $1.00 \times 10^{-2}$ Gy.

TABLE I. EFFECT OF GROWTH PHASE ON D-VALUES FOR *A. hydrophila* (irradiated in culture broth and plated on nutrient agar)

| Strain | Stationary phase cells | log phase cells |
|---|---|---|
| K144 | 18.1 | 18.0 |
| BA2 | 19.0 | 19.5 |
| BW83 | 16.5 | 18.3 |
| F6-10 | 17.6 | 16.9 |
| B2-10 | 17.8 | 21.6 |

TABLE II. EFFECT OF PLATING MEDIUM AND IRRADIATION MEDIUM ON D-VALUES FOR *A. hydrophila*

| | Starch ampicillin agar | | Nutrient agar | |
|---|---|---|---|---|
| Strain | Growth medium | Phosphate buffer | Growth medium | Phosphate buffer |
| K144 | 16.2 | 15.5 | 15.8 | 14.8 |
| BA2 | 18.7 | 18.1 | 18.8 | 18.6 |
| BW83 | 16.8 | 15.9 | 15.7 | 15.6 |
| F6-10 | 15.7 | 15.7 | 15.5 | 14.0 |
| B2-10 | 15.5 | 13.7 | 15.4 | 14.9 |

TABLE III. EFFECT OF TEMPERATURE OF IRRADIATION ON D-VALUES OF *A. hydrophila* IN FISH (plated on starch ampicillin agar)

| | Temperature of irradiation (°C) | | |
|---|---|---|---|
| Strain | 22 | 2 | −15 |
| K144 | 13.7 | 17.7 | 26.2 |
| BA2 | 15.2 | 19.3 | 31.4 |
| BW83 | 14.5 | 16.1 | 34.0 |
| F6-10 | 11.0 | 14.1 | 23.3 |
| B2-10 | 11.3 | 15.6 | 22.2 |

TABLE IV. D-VALUES OF *A. hydrophila* IRRADIATED IN GROUND BEEF AT 2°C
(plated on starch ampicillin agar)

| Strain | |
|---|---|
| K144 | 14.0 |
| BA2 | 14.3 |
| BW83 | 18.9 |
| F6-10 | 15.1 |
| B2-10 | 15.0 |

indicate that *A. hydrophila* is slightly more radiation resistant than *Yersinia enterocolitica* and *Campylobacter jejuni,* but not as resistant as *Salmonella* when these pathogens were irradiated in raw beef. However, our D-values for *A. hydrophila* in fish at 2°C are similar to those reported by Lambert and Maxey [3] for *C. jejuni* in ground beef and turkey. Overall, the results of our study indicate that a dose of 100 krad should be efficacious for the elimination of the levels of *A. hydrophila* encountered in retail fresh foods.

## REFERENCES


[1] GIDDINGS, G.G., Food Technol. 38 (1984) 61.
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[3] LAMBERT, J.D., MAXEY, R.B., J. Food Sci. 49 (1984) 665.